HEAT-DISSIPATING FIN MODULE

BACKGROUND OF THE INVENTION

Field of Invention

The invention relates to a heat-dissipating fin module for heat-generating devices. In particular, it is a heat-dissipating fin module for side-blowing fans.

Related Art

An electronic device is comprised of many electronic elements. Taking the computer as an example, there are many electronic elements on the motherboard that can generate a lot of heat during operations. Such elements include the central processing unit (CPU), the south/north bridge chips, the graphics chip, and the dual in-line memory modules (DIMM's). The operation speeds of these electronic elements become much faster than before. For example, the work frequency of the CPU is now over 1GHz, with a heat-dissipating power of 50W. If the heat cannot be immediately removed, these electronic elements may be overheated to affect their stability and reliability and to shorten their lifetime. Therefore, heat dissipation is a serious problem when the electronic device operation frequencies become higher.

Currently, the electronic device heat dissipation is achieved by heat conduction, convection or radiation to release the generated heat to the environment. A primary means is to use the combination of a heat-dissipating fin module and a fan. The heat-dissipating fin module is made of metal. It has a heat-conductive base whose bottom is directly installed on the electronic device that generates heat. The heat-conductive base is formed with several heat-dissipating fins. The heat produced by the heat-generating electronic device is transferred via the heat-conductive base to the heat-dissipating fins. The fan generates airflow through the fins to have heat exchange with the fins. The heated air is then expelled to the ambient space, bringing away the heat on the heat-dissipating fin

module and lowering the temperature of the electronic device.

The heat-dissipation efficiency of the fin module is usually determined by its material and structure. The early heat-dissipating fin modules are often made of aluminum because of its small thermal resistance, light weight and low cost. However, as the electronic device work frequency continuously increases, the heat-dissipation efficiency has to be increased too. Therefore, people start to use copper as the material for heat-dissipating modules.

The thermal conduction coefficient of copper is about 1.8 times that of aluminum, while the density of copper is about 3 times that of aluminum. In other words, for heat-dissipating fin modules of the same volume and area, the one made of copper is 3 times heavier than that made of aluminum. Therefore, although the heat-dissipating fin module made of copper has a better thermal conduction coefficient than that made of aluminum; the former is much heavier than the latter. One thus has to take both the weight and the thermal conduction coefficient factors into account when making the fins.

Existing heat-dissipating fin modules on the market are all made of materials with similar compositions. The heat-dissipation efficiencies are also very close. Therefore, how to increase heat dissipation by having a better structure has become the main research goal of the manufacturers.

For example, the heat-dissipating fins are usually installed vertically on the base of a heat-dissipating fin module. One of the features of a vertical heat-dissipating fin module is that the flat fins provide linear airflow channels. However, the drawbacks of this structure are that the heat-conductive area is too small, that the heat transfer time is too short, and that the parallel airflow cannot provide ideal heat convection once leaving the separation of the fins. Although the patent provides a layered structure, the structure and arrangement of the vertical structure still have room for improvement.

SUMMARY OF THE INVENTION

In view of the foregoing, the invention wants to solve the problems for vertical heat-dissipating fin that the heat conduction area is small, that the heat transfer time is short, and that the linear airflow channel cannot provide ideal heat convection effects.

In view of the foregoing, the disclosed heat-dissipating fin module includes: a heat-conductive base installed on a heat-generating component of an electronic device; several first heat-dissipating fins vertically installed at intervals on one half side of the heat-conductive base; several second heat-dissipating fins vertically installed at intervals on the other half side of the heat-conductive base. Each of the first heat-dissipating fins has a curved surface and is parallel to one another. The space between adjacent first heat-dissipating fins forms a first airflow space for air to pass through. Each of the second heat-dissipating fins has a curved surface and is parallel to one another. However, the curvature centers of the second heat-dissipating fins are on the opposite side to those of the first heat-dissipating fins. The space between adjacent second heat-dissipating fins forms a second airflow space for air to pass through.

The invention achieves through the curved first heat-dissipating fins and second heat-dissipating fins the effects that the heat-conductive area is increased, that the heat transfer time is elongated, and that the curved airflow paths provide ideal heat convection effects.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will become more fully understood from the detailed description given hereinbelow illustration only, and thus are not limitative of the present invention, and wherein:

FIG. 1 is a three-dimensional view of a preferred embodiment of the invention; and

FIG. 2 is a schematic top view of FIG. 1.

DETAILED DESCRIPTION OF THE INVENTION

With reference to FIGS. 1 and 2, the heat-dissipating fin module 100 according to a preferred embodiment of the invention can be applied to heat-generating devices such as the CPU, the south/north bridge chips, the graphics chip, and the DIMM's, avoiding the devices from damages due to overheating. The heat-dissipating fin module 100 is made of metals with high thermal conduction coefficients (e.g. aluminum and copper). It consists of a heat-conductive base 200, several first heat-dissipating fins 300, several second heat-dissipating fins 400, and two third heat-dissipating fins 500.

The heat-conductive base 200 is a piece of block that fits that shape of the heat-generating device. Its bottom is attached to the heat-generating device (not shown) for direct contact. Generally speaking, a heat-dissipating gel is applied between the heat-conductive base 200 and the heat-generating device. This increases the thermal conductance of the system.

The first heat-dissipating fins 300 are vertically installed on the front half side of the heat-conductive base 200 (referring to FIG. 1). Each of the first heat-dissipating fins 300 has an arc shape. They are installed by gluing or welding. They can also be formed by cutting or squeezing. All the first heat-dissipating fins 300 are parallel and equal in length. The centers of the curved surfaces are on a line. The space between adjacent first heat-dissipating fins 300 is a first airflow space 320, forming a curved airflow path. Moreover, the outermost first heat-dissipating fin 310 is shorter for fitting the rectangular shape of the heat-conductive base 200.

The second heat-dissipating fins 400 are also installed vertically on the rear half side of the heat-conductive base 200 (see FIG. 1). Each of the second heat-dissipating fins 400 has an arc shape. They are installed by gluing or welding. They can also be formed by cutting or squeezing. Although the centers of the second heat-dissipating fins 400 are also on the same line as those of the first heat-dissipating fins 300, they are on opposite sides. All the second heat-dissipating fins 400 are parallel and equal in length. The space

between adjacent first heat-dissipating fins 400 is a first airflow space 420, forming a curved airflow path. Similarly, the outermost first heat-dissipating fin 410 is also shorter for fitting the rectangular shape of the heat-conductive base 200.

The third heat-dissipating fins 500 are also installed vertically on the heat-conductive base 200. They are on the outer sides of the neighboring area between the first heat-dissipating fins 300 and the second heat-dissipating fins 400. The purpose of having these two third heat-dissipating fins 500 is to fully utilize the space, increasing the heat-dissipation area. They are straight without bending to either side. Of course, it does not matter if the two third heat-dissipating fins are installed.

After installing the disclosed heat-dissipating fin module 100 on a heat-generating device, a fan is provided on one side (not shown) to produce airflow. The airflow paths are shown in FIG. 2. Since both the first heat-dissipating fins 300 and the second heat-dissipating fins 400 have curved surfaces, there is a larger heat-dissipation area and the curved airflow paths have a longer length for elongating the heat transfer time. As the airflow paths on both sides do not cross or overlap, a better heat convection effect is achieved.

Certain variations would be apparent to those skilled in the art, which variations are considered within the spirit and scope of the claimed invention.